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STATION COMPUTER-BASED WORKSTATIONS SPACE TECHNOLOGIES FOR EVOLVING 1 FREEDOM

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TECHNOLOGY FOR SPACE STATION EVOLUTION A WORKSHOP

EVOLVING TECHNOLOGIES FOR SPACE STATION FREEDOM COMPUTER-BASED WORKSTATIONS

NASA, Johnson Space Center Dean G. Jensen, Ph. D. Marianne Rudisill, Ph. D

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 COMPUTER DISPLAY FORMAT AND CONTENT
 - WORKSTATIONS
- DISTRIBUTED SYSTEM CONTROL FOR SYSTEMS/ROBOTS/FREE FLYERS
- CURRENT ACTIVITIES AND EVOLVING TECHNOLOGIES





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INTRODUCTION

THE HCI SOFTWARE ENVIRONMENT HAS THE FOLLOWING SEVEN MODULES

WINDOW MANAGER

Provides and controls on-screen windows

USER INTERFACE MANAGEMENT SYSTEM

Provides dialog, help and information, and error message management CONTROL AND MÖNITOR DISPLAY MANAGER

environment to link dynamic displays with operational data and commands store them in Data Definition Files (DDF), and provides the runtime Provides the capability to define and build dynamic displays and

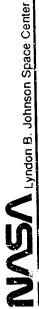
<u>USER INTERFACE LANGUAGE MANÁGER</u>

Generates and executes User Interface Language commands and procedures CAUTION AND WARNING ANNUNCIATION MANAGER

Displays caution and warning events and messages and accepts crewmember acknowledgements VIDEO DISPLAY MANAGER

Routes and displays video images intermixed with text and graphics

Provides initialization, user login authorization and encryption, security legging, USER SUPPORT ENVIRONMENT SESSION MANAGER user profile management, and word processing

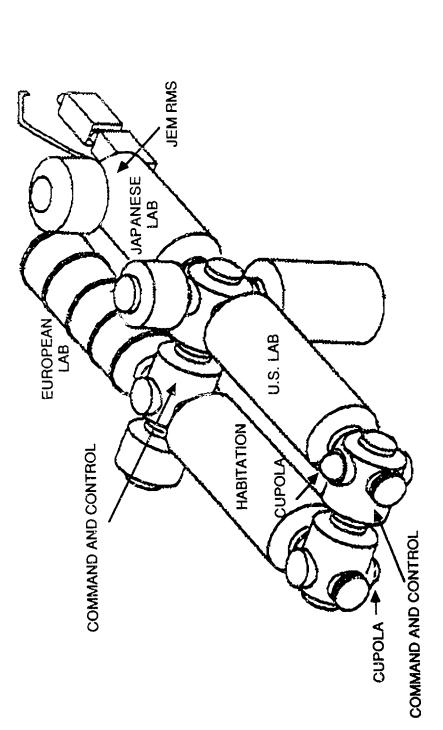


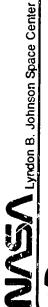
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WORKSTATION LOCATIONS



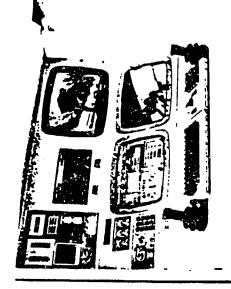


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COMMAND AND CONTROL WORKSTATION CONCEPT

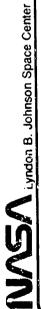


Features

- Three 15" DisplaysFull KeyboardTrackball
- Hand Controllers
- Hard-Copy Printer/Plotter Audio/Video Recorders
 - Safety-Critical D&C
- LightingCrew Restraints

Functions

- Systems Management
 - **Customer Support**
- Proximity Operations Telerobotic (MSS,FTS) Control
 - **External Operations Support**



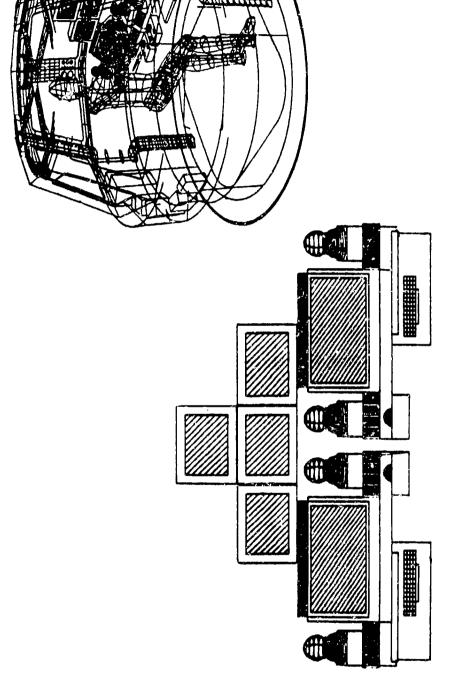
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CUPOLA WORKSTATION CONCEPT





January 16, 1990 MAN-SYSTEMS DIVISION JAPANESE EXPERIMENT MODULE RMS WORKSTATION CONCEPT FISION EQUIPMENT CONTROL PANEL J. LEWIS, Ph.D. ARE OPERATION ELECTROSICS(1/2)(2/2) ARM CONTROLLER(1/2) ARM CONTROLLER(2/2) MASTER ARE TY MORITOR(2) FIDEO CONTROL EQUIPMENT KANAGEMENT COMPUTER(A) - MANAGEMENT COMPUTER(B) SPACE STATION WORKSTATIONS N. A. T MONITOR(1) FOR EVOLVING TECHNOLOGIES FOR FREEDOM COMPUTER-BASED 2. C. 2. S. 1 CONTROL PAREL, MAIR ARM HOLD/RELEASE. KEY BOARD **BISPLAY** HAMAGEMENT EQUIPMENT INTRODUCTION ELECTRIC POFER CONVERTER(A)_ ELECTRIC POTER CONVERTER(S) .. **ELECTRONICS** CONTROL PANEL **EVOLVING** UPERATION RACK CONTROL LACK

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REMOTE DEVICES CONTROLLED FROM WORKSTATIONS

FREE FLYERS

- EUROPEAN SPACE AGENCY MAN-TENDED FREE FLYER CREW AND EQUIPMENT RETRIEVAL SYSTEM
 - - ORBITAL MANEUVERING VEHICLE

LARGE MANIPULATORS

- SPACE STATION REMOTE MANIPULATOR SYSTEM (RMS) JAPANESE EXPERIMENT MODULE RMS

DEXTEROUS MANIPULATORS

- JAPANESE SMALL FINE ARM FLIGHT TELEROBOTIC SERVICER
- SPECIAL PURPOSE DEXTEROUS MANIPULATOR

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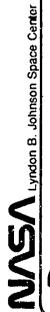
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REMOTE MANIPULATOR SYSTEM Ŋ INTRODUCTION

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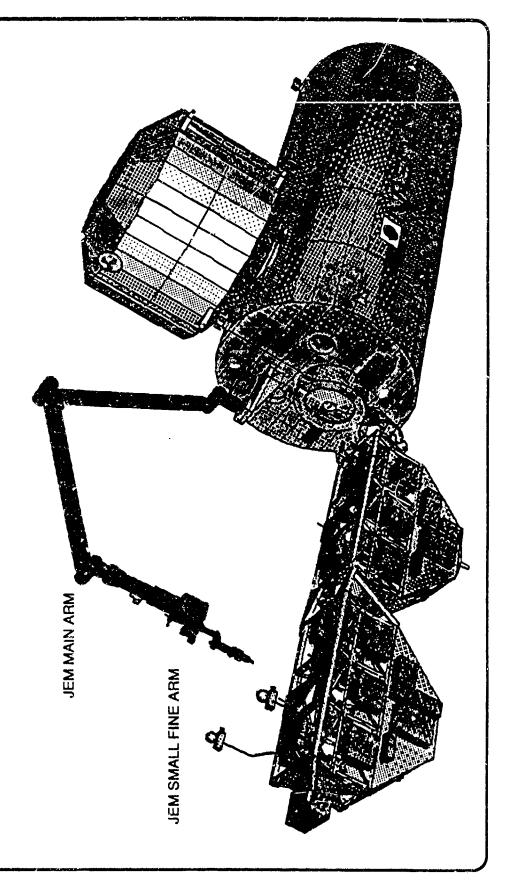


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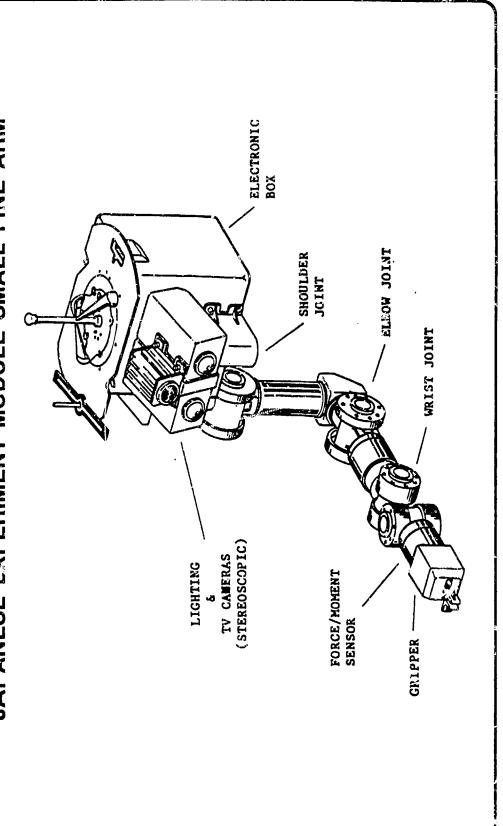




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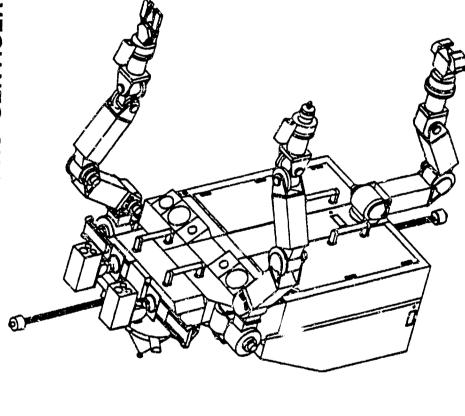
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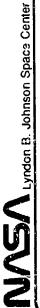
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FLIGHT TELEROBOTIC SERVICER





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EVOLVING TECHNOLOGIES

HUMAN-COMPUTER INTERACTION

VOICE RECOGNITION AND PRODUCTION

• FACILITATE "HANDS-FULL" TASKS (CAMERA CONTROL DURING TELERCBOTIC MANIPULATIONS)

DIRECT MANIPULATION

- **TOUCH SCREENS**
- 3-D DISPLAY MANIPULATION
- ZERO-G CURSOR CONTROL DEVICES

ENHANCED INFORMATION DISPLAY

- 3-D COMPUTER-ENHANCED IMAGES
 VIDEO MANIPU ATION (OBJECT ENHANCEMENT & TRACKING)
 VIDEO WITH TEXT AND GRAPHICS OVERLAYS
 - VIDEO STEREO VIEWING TECHNIQUES
 - **MULTI-TASKING MANAGEMENT**

KNOWLEGE-BASED OR INTELLIGENT SYSTEMS USER MODELING METHODS AND TOOLS HC! PROTOTYPING TECHNOLOGY SOFTWARE AUTOMATION



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EVOLVING TECHNOLOGIES

WORKSTATION/ROBOTICS RELATED ACTIVITIES

WORKSTATIONS VIRTUAL

MACHINE VISION SYSTEMS

- OPTICAL SYSTEMS e.g. TRACKING EARTH'S RAD. BUDGET SAT. LASER SYSTEMS e.g. MODEL-BASED SYSTEMS FOR RECOGNITION SUPERVISED AND AUTONOMOUS MODES
- PROVIDING OPERATOR AIDS (e.g. RANGE / RATE)
 - EDGE DETECTION

ANIMATION

- REPRESENT RANGE/RATE INFORMATION
 PRODUCE "SYNTHETIC" VIDEO VIEWS (FROM CDA DATABASE)

FORCE REFLECTION (HAND CONTROLLER) SYNTHESIZED FORCE REFLECTION

- AUDIO
 - **VISUA**

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